

The Doctor's PDA and Smartphone Handbook: Medical references

Mohammad Al-Ubaydli¹ Chris Paton²

J R Soc Med 2006;99:120–124

This is the fourth in a series of extracts from a forthcoming book by M Al-Ubaydli and C Paton. The website [www.rsmjpress.co.uk/bkpd.htm] includes video tutorials to accompany this text.

A handheld computer smaller than a paperback can carry the equivalent of several bookshelves of text, and you have whole libraries from which to choose. For many doctors, the ability to carry and refer to their own favourite books on a handheld computer is the best reason for investing in a device.

The investment can be expensive, however, so you should consider your options before buying. The first consideration is storage. Although some devices today can carry a lot of data—measured by the amount of random access memory (RAM)—they still store less than 10% of the storage capacity of the biggest secure digital card. Furthermore, the cost of storage on a secure digital card is less than 10% of the cost of a handheld computer's built-in RAM. In other words, it is far better to buy a \$200 (c.£114) handheld computer with modest RAM and a \$100 (c.£57) high-capacity secure digital card than to buy a \$300 (c.£171) handheld computer with more RAM. Even if you buy a \$600 (c.£340) device, you will still not come close to the capacity of the \$100 (c.£57) card. This capacity is impressive. A 1 gigabyte card can store around 600 000 pages of text. Pictures take up far more space than text, but you will still be able to carry several anatomy textbooks on a 1GB card, along with hours of music and scores of photographs.

The second consideration is that a lot of reference texts are available free of charge, and many are perfectly good for your needs—even if the lack of advertising budget means that they are not as easy to find. Furthermore, for most doctors, the most valuable and important reference texts are generated locally—your own Word documents, your clinic's guidelines, your hospital's protocols or the local government's social services documentation. For around \$30 (c.£17), you can create handheld computer versions of all of these and share them with your team.

Finally, if you do decide to buy commercial textbooks for your device, consider that each costs at least \$60

(c.£34)—and many cost much more. Choose carefully and take your time in doing so, because so many excellent offerings are available. It is easy to be tempted by all of these.

FREE REFERENCES

The National Library of Medicine (NLM) in the US makes several resources available free of charge at [www.nlm.nih.gov/mobile]. These include two versions of the Medline database which allows you to search the medical literature and read abstracts of most modern biomedical papers on your device. The Wireless System for Emergency Responders (WISER) software provides differential diagnoses and treatment guidelines for clinicians who suspect their patients have encountered hazardous materials.

Finally, the National Center for Biotechnology Information Bookshelf has handheld computer versions of several textbooks (Figure 1). These include *Clinical Methods* (a comprehensive guide to clinical examination), *Genes and Disease* (a primer on many common hereditary diseases) and *Medical Microbiology* (with encyclopaedic discussions of common microbes). The NLM's own *AHRQ Evidence report*

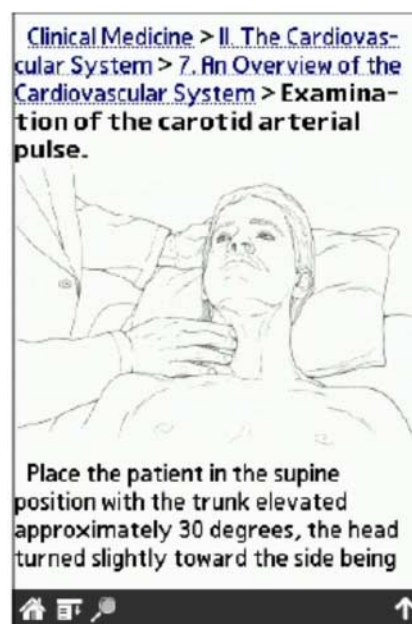


Figure 1 The US National Library of Medicine provides several textbooks free of charge, including *Clinical Methods*, a guide to examination

¹Bethesda, MD, USA; ²Auckland, New Zealand

Correspondence to: Dr Mohammad Al-Ubaydli

E-mail: me@mo-md

summaries is well worth downloading, because it lists protocols for the management of many conditions and even clinicians outside of the USA will appreciate the depth of the content.

Textbooks are not the only valuable references—laboratory result normal ranges, Spanish medical dictionaries and lists of medical abbreviation also can be useful. Such information is stored in databases, which was covered in more detail in the January issue. The advantage of using a database rather than an electronic book for storing this information is the ability to categorize data and run sophisticated searches. You can find all these data files on portals such as [www.handango.com], but if you follow our recommendation to buy the HandBase database software, you should look through the HandBase website [www.ddhsoftware.com] in the 'Free Downloads' section.

Finally, ePocrates [www.epocrates.com] makes a USA formulary, Epocrates Rx, available free of charge (Figure 2). British, German and Spanish versions exist for clinicians outside the USA. The software's ability to identify drug interactions already has prompted one medical indemnity company to subsidize the purchase price of handheld computers for its residents because it could reduce prescription errors. In many cases, however, the most important references are local ones.

MAKING YOUR LOCAL REFERENCES AVAILABLE

Your local references are available in several formats, and it is unusual for these to be suitable for the small screen of your handheld computer. Paper is the worst format, of course, because you have to retype the information into your computer before you can use it. Someone somewhere in your institution, however, has the original file from

which the paper version was printed. Find that person and ask for that file.

The three most common formats are Microsoft Word documents, Adobe Reader documents and web pages. Each of these has its problems.

Although most devices include software that is compatible with Microsoft Word, the compatibility is not perfect. Ironically, Microsoft's own Pocket Word is rather poor, losing a lot of the formatting that you may depend on to read the text correctly and coping poorly with tables.

Far more significantly, all of these software tools allow the user to edit the Microsoft Word document. This means it is possible to for you to write a protocol that includes drug dosages, but for a colleague then to accidentally delete a decimal point in one dosage—worse still, they can beam that incorrect document to other colleagues.

REFERENCE INFORMATION ON HANDHELD COMPUTERS SHOULD NOT BE EDITABLE

A great alternative is to use RepliGo's software [www.repligo.com]. This comes in two versions: the desktop version costs \$30 (c.£17) and can convert your Word documents into uneditable RepliGo documents. Buy one copy for your team. The second version works on handheld computers and can read RepliGo documents. Install it on all of your colleagues' devices, because it is available free of charge.

RepliGo is also good for Adobe Reader documents. These documents cannot be edited, and Adobe makes Adobe Reader software for Palm Powered and Pocket PC devices. The software adjusts poorly to the small screen size, however, which makes for a frustrating experience for the user.

RepliGo's desktop software converts Adobe Reader documents into RepliGo documents. On your handheld computer, you have two options for reading the document. The first is to look at the document as it was originally designed for Adobe Reader, which preserves the layout, columns of text, pictures and tables. This is good for getting an overview of the pages originally designed for printing (Figure 3). The second option, which you will find most useful most often, is the text reflow view. By clicking the 'REFLOW icon' button, RepliGo will reflow the text of the page so that it is in just one column the same width as your device. This means you can comfortably read the document from start to finish by pressing the up and down buttons on your device. Adobe Reader, by contrast, can force you to scroll right every few words to read more of the line, as it tries to preserve the original formatting of the page.

To see an example of this, visit [www.handheldsfor doctors.com/plos] where a RepliGo version of *PLoS medicine* is stored. This is the leading open access clinical journal, and its funding means that all its issues are available free of



Figure 2 Screen from Epocrates Essentials

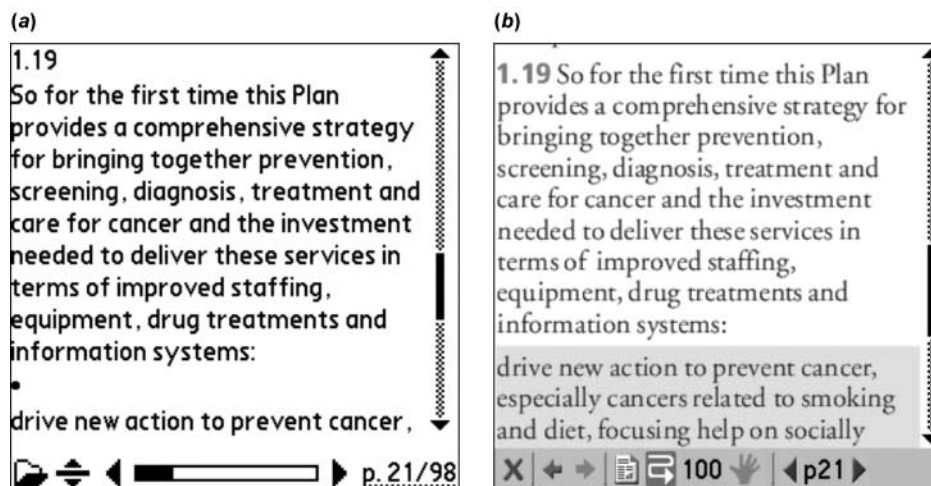


Figure 3 Document in Adobe Reader format on a Palm Powered device with Adobe Reader software (a) and the same document converted to RepliGo format and viewed on a Palm Powered device (b)

charge. The RepliGo handheld computer version of the issues combines the great illustrations of PLoS with the illuminating text of its authors.

RepliGo is not useful for webpages, however, because useful websites usually are composed of many webpages, with rich links between those pages. A single RepliGo document, by contrast, cannot contain more than one webpage and certainly does not allow linking between webpages. Instead, you should use Plucker [www.plkr.org]. As with RepliGo, a desktop version of Plucker creates Plucker documents and a handheld computer version reads them. Unlike RepliGo, both versions are available free of charge, as they are examples of high-quality, open-source software. Plucker is capable of downloading entire websites, including your hospital's internal webpages, and compressing the pages for efficient storage on your device but optimizing the presentation for the small screen.

Finally, HANDBase is good for storing local data, such as the appropriate blood tube for each blood test.

CONVERTING A DOCUMENT TO REPLIGO FORMAT

After you have installed RepliGo onto your PC and handheld computer, the software can convert any document that can be printed. For example, to convert a Microsoft

Word document that details your hospital's protocol for patients with febrile leukaemia:

- 1 Open the document in Microsoft Word
- 2 From the 'File' menu, select 'Print . . .'
- 3 To the right of the printer's 'Name:', select 'RepliGo' from the drop-down menu (Figure 4)
- 4 Click the 'OK' button
- 5 Enter the name you want for the document on your handheld computer
- 6 Select from the drop-down list to the right of 'Location:'. 'Handheld' means the file will be stored on your device, which means it is fast but will occupy precious space. 'SecureDigital (SD) Card' is a little slower, but it is preferable as you have a far bigger storage area
- 7 Click the 'OK' button
- 8 Synchronize your handheld computer
- 9 Open RepliGo on the device to read the document.

CONVERTING A DOCUMENT TO PLUCKER FORMAT

After you have installed Plucker onto your PC and handheld computer, the software can convert any webpage or website into a single file. Your connection to the Internet must be working at the time of conversion, but after that

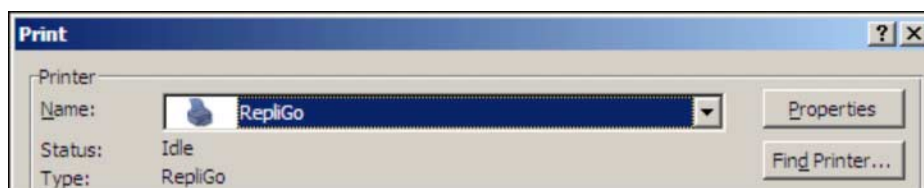


Figure 4 Converting a document to RepliGo format is as easy as printing the document

you can read all the webpages on your device without the connection. For example, to convert the website of the government's driving regulations for medical conditions:

- 1 Use your web browser to go to the main webpage for that website. This will be the starting point for Plucker on your device
- 2 Copy the address of that webpage from you web browser
- 3 Open Plucker
- 4 From the 'File' menu select 'Add new channel using wizard . . .'
- 5 Enter a name for the channel and click the 'Next' button
- 6 Paste the address you had copied and click the 'Next' button
- 7 Type a number to the right of 'Retrieve linked pages to a depth of'. A good number is '2'. The higher this is, the less likely that you will miss out a copy of a page from the site, but the much greater the storage space on your handheld computer. Click the 'Next' button
- 8 Confirm that the channel's content will be sent to your handheld computer and click the 'Next' button then the 'Finish' button
- 9 From the 'Update' menu, select 'Update all channels' to get the latest copy of the websites
- 10 Synchronize your handheld computer
- 11 Open Plucker on the device to read the website.

COMMERCIAL REFERENCES

Few commercial textbooks are available for less than \$60. High-quality publishers include Skyscape [www.skyscape.com], Franklin [www.franklin.com] and Lippincott Williams & Wilkins [www.lww.com]. They make available such famous general textbooks as the *Oxford Handbook Of Clinical Medicine*,² *Griffith's 5 Minute Clinical Consult*³ and *Harrison's Principles Of Internal Medicine*,⁴ as well as excellent texts for each specialty.

InfoRetriever takes a different approach, providing the text of InfoPOEMs [www.infopoems.com]. This consists of Patient-Oriented Evidence that Matters (POEM), which means that the authors have scanned the literature for evidence that affects your clinical management. Furthermore, they have condensed it significantly so that accessing the information while the patient is surprisingly quick.

You should, however, choose carefully before paying the prices that publishers charge. In particular, try to install a trial version of any book you are interested in, because this will give you an idea of the complication of the publisher's digital rights management software. This is the software that the publisher uses to stop you making copies of its textbook. While it is important to make sure that the publisher does not lose money from piracy, it can punish

honest customers. The more complicated the software, the more likely that a problem will arise in the future that stops you from reading a book for which you have paid good money.

Stay away from publishers with complex installation software. One notable exception is MedHand [www.medhand.com]. The company sells subscriptions to its textbooks of 1 year's duration. In return you get four secure digital cards per year. Each contains the latest version of the *British National Formulary*, as well as more than 20 textbooks, including the *Oxford Handbook Of Clinical Medicine* and an astonishing anatomical atlas. No installation is necessary—you simply insert a card into your device and it is ready to use. The downside to this is the cost. At the time of writing, one year's subscription cost more than £300. Institutional discounts are available, which is why some hospitals are buying the cards for their clinicians. One irritating aspect is that each card stops working after a certain date. The company explains this by saying that out-of-date prescription information must not be made available, but old paper copies of the *British National Formulary* and other formularies still are available in most wards and clinic and are perfectly useful.

That computer technology is used to produce greater restrictions at a greater price than with paper texts is unfortunate. The reverse should be true, and you should direct your money to publishers that understand this best.

READING FOR FUN

The fondness we had for our first PDAs was because the device allowed us to reclaim reading time. Clinical school meant spending a lot of time in the hospital. We had plenty of spare moments, but few paper books that we could carry. The PDA, however, could store novels and biographies as electronic books, and eventually Mohammad would also buy audio books to listen to while walking.

Project Gutenberg [www.gutenberg.org] provides free digital versions of books that are in the public domain. For the most part, this means old texts that are out of copyright, but we all could benefit from a classical education. Each book is available in any of several formats—usually simple text or a single webpage. Use RepliGo or Plucker to convert it into something suitable for your device.

For the latest books, you will have to pay money, and one of the best sites is eReader [www ereader.com]. Each electronic book costs about the same price as the hardback edition on amazon.com. That means a 10–30% discount, but it is still more expensive than the paperback version. The freely available software for reading these books, however, is wonderfully unobtrusive. A lot of thought went into providing a good interface that helps reading.

Clinical vignette of medical references

In his prime, Dr Avicenna was a skilled surgeon and an expert in his specialty. He liked to carry around general medical textbooks that he could refer to for knowledge outside his specialty. For £30, he bought Saunders Pocket Essentials Of Clinical Medicine [www.fleshandbones.com/medicine/ballinger], which included the paperback version and a handheld computer version. He knew that the medical team in the hospital was provided with subscriptions to MedHand, but for his team he just used ePocrates Rx to spot any drug interactions.

Dr Avicenna stored all these books on a \$200 4GB secure digital card that he bought for his smartphone. This card also allowed him to store his entire classical music collection. By connecting a speaker to his device, he could play his favourite symphonies in theatre while operating. For his car, he had a \$20 connector from his cassette player to his smartphone. He could play the same music through his car's speaker, but he preferred to listen to audio books from Audible for his morning commute.

Finally, on nights that he had to stay in the hospital, Dr Avicenna appreciated having the books he had bought from eReader. He could switch off the light in his room and yet read comfortably through the brightness of his smartphone's screen. Two minutes after he fell asleep, the screen would switch off, saving the page he had been reading till the next time he wanted to resume the novel.

Most importantly, of all the companies that produce electronic books, this one treats its customers with the greatest respect. To unlock a book, you simply need the name and credit card number of the person who bought the copy in the first place. This simplicity is why Mohammad still has the library of 30 books he bought from them and why we recommend the company to colleagues and friends.

Audible [www.audible.com] is the other company that we recommend – this time for audio books. If you sign up for the \$15 (c.£9) a month deal, you can get one book and one radio programme per month for your handheld computer, while their \$20 (c.£11) deal gets you two books. You can interrupt and restart your subscription whenever you want. Once you get a book, though, it is yours forever—regardless of subscription status—and the company allows you to download it as many times as you

want in the future. Mohammad has been subscribing on and off since medical school and has gone through several PCs, handheld computers and countries in the process.

He still has access to more than 50 audio books that he bought and can make CD versions to lend to friends and family. It is not quite as simple as beaming but is still a wonderful way of sharing.

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